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Clinical Quality Linked Data (CQLD) on health.data.gov

**Health Data Initiative Forum Presentation/
Demonstration**

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 - A brief overview of Linked Data
 - And the Clinical Quality Linked Data project at CMS
- Part II – Demonstration
 - Screenshots of scripted interactions highlight features and functionality
 - On health.data.gov
 - Links to examples given
 - With some ‘sequence’ exceptions
 - But it gives an idea of what to click on and why ☺

Part I - Presentation

1. What is Linked Data?
2. Why is Linked Data Useful?
3. Linked Data Mechanics
4. CQLD Features
5. Vision and Mission
6. Acknowledgements
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[1] What is Linked Data?

- An evolution and maturation of the WWW
 - From the Web of Documents
 - Where this page <links to> that page
 - To the Web of Data
 - Where this datum <links to> that datum
- Providing global data identity resolution
 - Using ‘dereferenceable’ HTTP URI’s
 - Solves data disintegration root cause (local identity = info silo)
 - Making fine-grained data uniquely addressable
 - On the global network of computers!

[1] Linked Data Principles

1. Use URI's as names for things
2. Use HTTP URI's so that people can look up those names
3. When someone looks up a URI, provide useful information, using the standards (RDF*, SPARQL)
4. Include links to other URI's so that they can discover more things
 - Source
 - [Linked Data Design Issues](#), Tim Berners-Lee

[1] Linked Data Standards

- Resource Description Framework (RDF)
 - A standard model for data interchange on the WWW
 - RDF data is a *graph of 'triples'*
 - Subject-Predicate-Object (SPO: 1-2-3)
 - aka node-arc-node, entity-attribute-value, datum1-link-datum2
- RDF Schema (RDFS)
 - A standard for describing RDF *Vocabularies*
 - classes of RDF resources and their relationships
- SPARQL Protocol and RDF Query Language (SPARQL)
 - A standard RDF query language and (HTTP) protocol
 - SPARQL is to RDF as SQL is to relational data

[2] Why is Linked Data Useful?

- ***Turns the Web into a distributed database***
 - A ‘giant global graph’ of ‘data *in* the Web’
- Graphs are flexible, adaptable, agile
 - Integrate new data without app/infrastructure changes
- Makes it easy for mashup apps to find/merge data
 - Triples normalize conceptual and physical data models
 - Access, query, process and persist consistently across domains
- Lightweight, Standard API for all Open Gov Data!
 - TCP/IP (net), HTTP (app), RDF (data), SPARQL (query)

[3] LD Mechanics: NIR <- Conneg -> IR

- HTTP Content Negotiation (conneg)
 - When you HTTP GET (aka *dereference*) a *Non-Information Resource* (NIR)
 - You receive a HTTP response code “303 See Other” that includes a “Location: URI”
 - You then HTTP GET an *Information Resource* (IR) at that location in some serialization format (media-type)
 - And you receive a document that contains data about the NIR

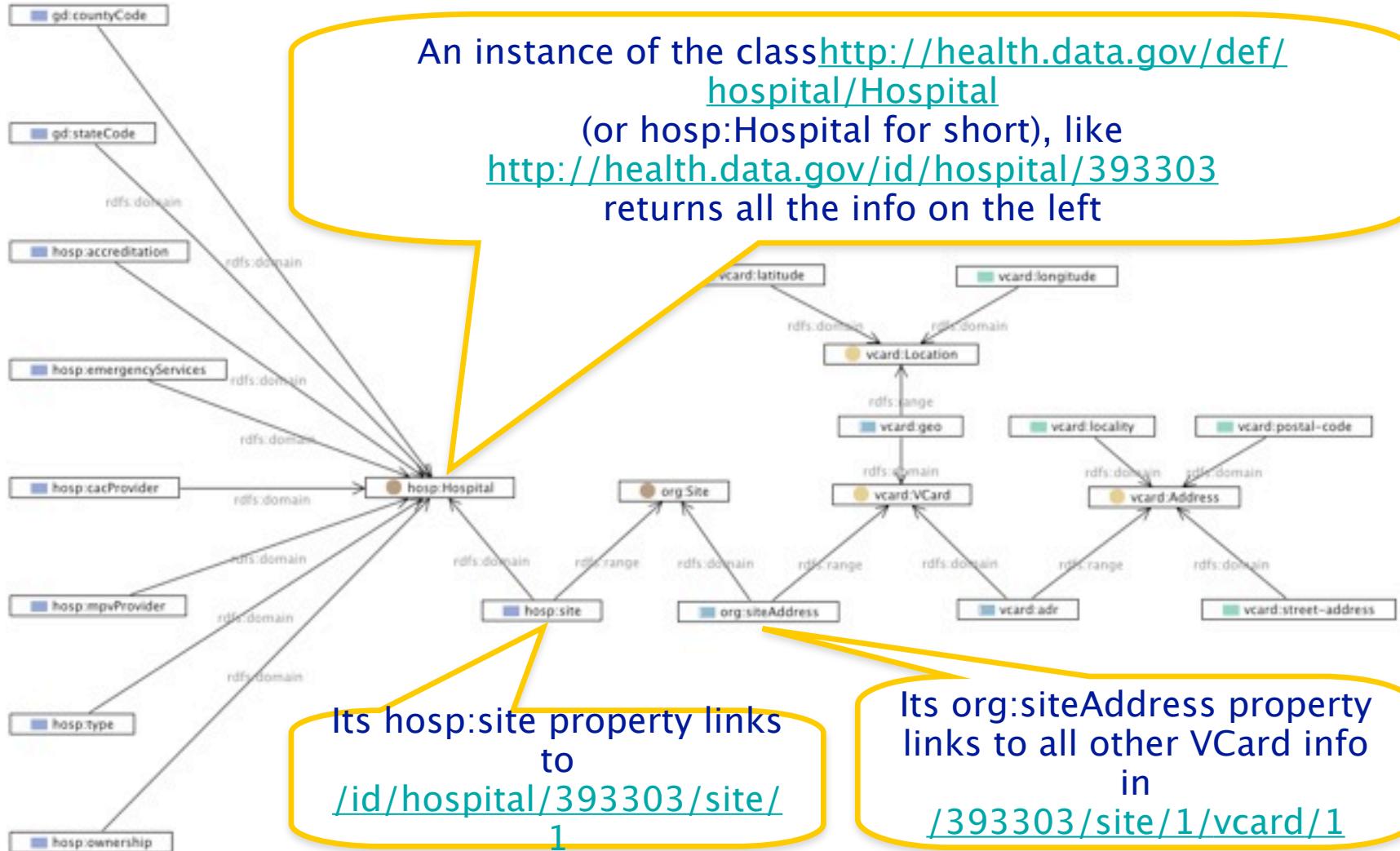
[4] CQLD URI Scheme Conventions

- NIR's are abstract and real world things
 - The RDFS class Hospital is an abstract thing
 - <http://health.data.gov/def/hospital/Hospital>
 - Here we are **defining** a vocabulary (ontology) name **hospital** which has within it a definition for a class **Hospital**
 - » Classes use UpperCamelCase, properties use lowerCamelCase naming conventions
 - ‘Children’s Hospital of Philadelphia’ is a real world thing that is an instance of the class Hospital
 - <http://health.data.gov/id/hospital/393303>
 - Here we are specifying a globally unique **identifier** for instance **393303** of a **hospital** class of thing in the real world

[4] CQLD URI Scheme Conventions

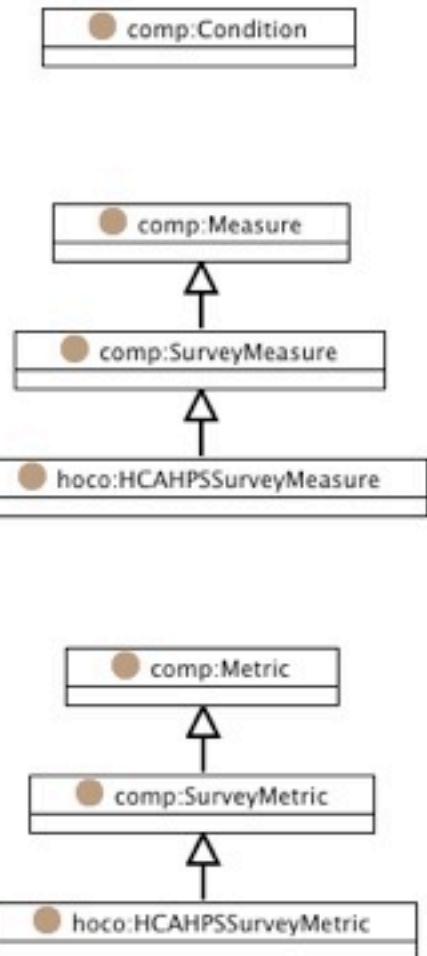
- When you dereference the NIR at;
 - <http://health.data.gov/id/hospital/393303>
 - You'll get a 303 response with the location of a generic IR at;
 - <http://health.data.gov/doc/hospital/393303>
 - That will inform you of all the available representations
- If you request a specific IR representation;
 - curl –H ‘Accept: **application/rdf+json**’ <http://health.data.gov/id/hospital/393303>
 - You'll get a 303 response with the location of a specific IR at;
 - <http://health.data.gov/doc/hospital/393303.json>

[4] Getting all the Hospital(s) information



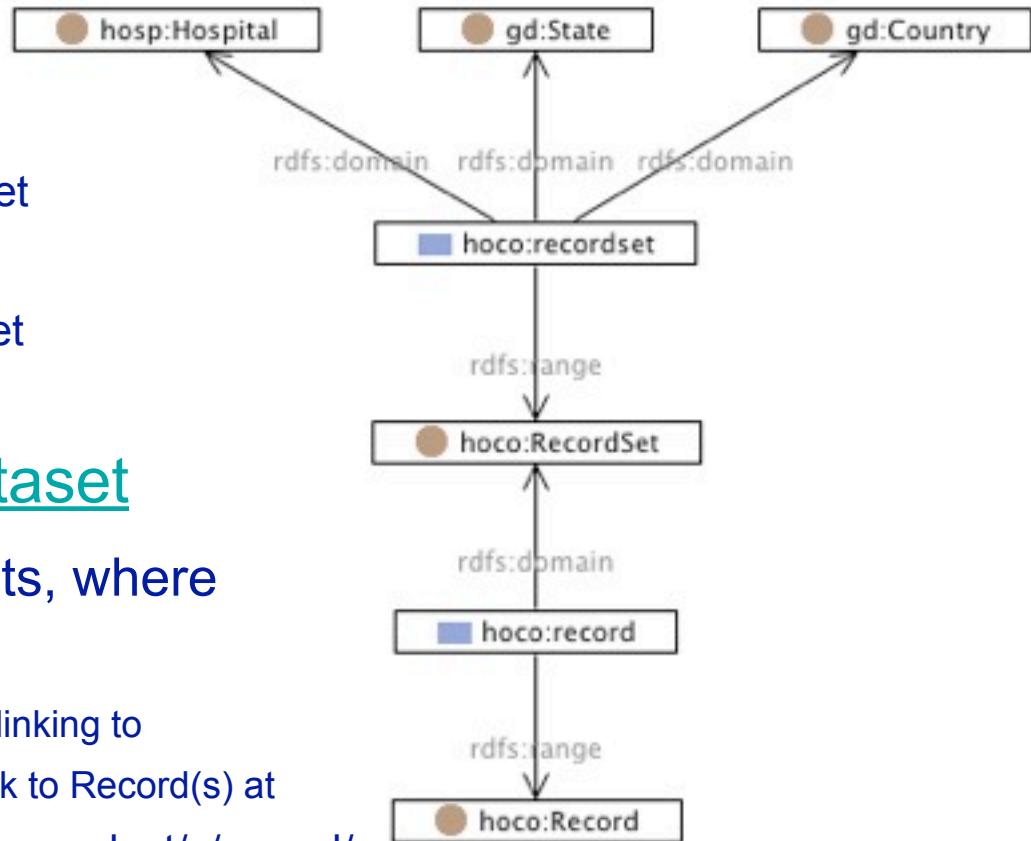
[4] Defining Conditions, Measures, and Metrics

- A few small component vocabularies define the classes shown on the right (among others)
 - <http://health.data.gov/def/compare/Condition>
 - There are 9 unique instances of this class
 - <http://health.data.gov/id/condition/1> through [/id/condition/9](http://health.data.gov/id/condition/9)
 - <http://health.data.gov/def/compare/Measure>
 - There are 2 subclasses, one in a different vocab
 - There are 59 unique instances of these classes
 - <http://health.data.gov/id/measure/1> through [/id/measure/59](http://health.data.gov/id/measure/59)
 - <http://health.data.gov/def/compare/Metric>
 - There are 2 subclasses, one in a different vocab
 - There are 32 unique instances of these classes
 - <http://health.data.gov/id/metric/1> through [/id/metric/32](http://health.data.gov/id/metric/32)



[4] Getting to all Hospital/State/Country Record Data

- Metadata triples (SPO)
 - ‘traversing the graph’
 - Hospital recordset RecordSet
 - State recordset RecordSet
 - Country recordset RecordSet
 - RecordSet record Record



- <http://health.data.gov/dataset>

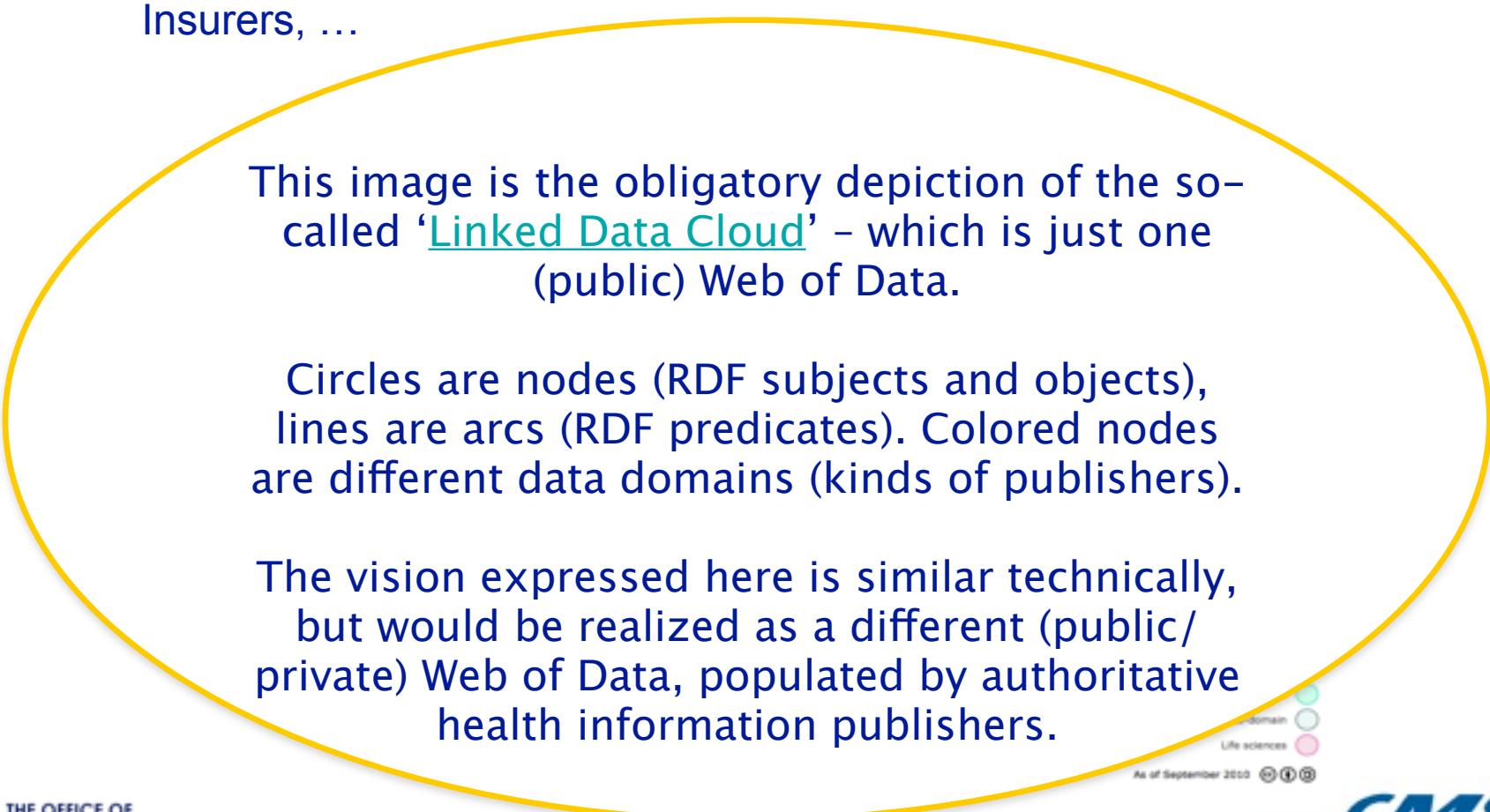
- Returns a list of all datasets, where
 - /dataset/name/yyyy-mm-dd
 - are void:Dataset(s), each linking to
 - RecordSet(s) that each link to Record(s) at
 - /dataset/name/yyyy-mm-dd/recordset/x/record/y
- <http://health.data.gov/dataset/cacn/2011-02-25/recordset/1/record/1>

[4] Other Features and Services

- Faceted search and browsing
 - Discover the data models and fine grained data *interactively*
 - Where your click stream is a query/report builder!
- Retrieve (request) multiple representation formats
 - Suitable for people and machines
 - .html, .csv, .json, .xml, .atom, .ttl, ...
- Query points and visualization services
 - Find the needle in the haystack
 - Query across all data at once, plot results on maps, ...
- Feeds, other API's, and more –
- Stay for (Part II) a Demonstration!

[5] Vision: Health Data Publisher Federation

- Imagine a Linked Health Data Cloud, that integrates;
 - Independently published data from Doctors, Hospitals, Clinics, Labs, Insurers, ...



This image is the obligatory depiction of the so-called '[Linked Data Cloud](#)' – which is just one (public) Web of Data.

Circles are nodes (RDF subjects and objects), lines are arcs (RDF predicates). Colored nodes are different data domains (kinds of publishers).

The vision expressed here is similar technically, but would be realized as a different (public/private) Web of Data, populated by authoritative health information publishers.

As of September 2010
Health domain
Life sciences

[5] Mission: Health IT

- Linked Data implements SOA
 - As RESTful Web Services;
 - That provide access to ***resource representations*** via HTTP's ***uniform interface***, and use ***hyperlinks as the engine of application state*** (HATEOS)
 - Giving rise to 'Data as a Service' (DaaS)
- Linked Data implements PCAST recommendations
 - Health IT Report
 - 'Data Element Access Services' (Faceted Browsing)
 - Universal Exchange Language
 - 'Metadata tagged' (RDF/XML and RDF Schemas)

[6] Acknowledgements – Special Thanks to:

- HHS
 - CTO Todd Park, OCIO John Teeter, Mary Forbes
 - CMS OCSQ Glenn Sperle
- OMB and GSA
 - Vivek Kundra, Data.gov PMO
- W3C
 - Sir Tim Berners-Lee, Sandro Hawke
- RPI
 - Professor Jim Hendler and the TWC

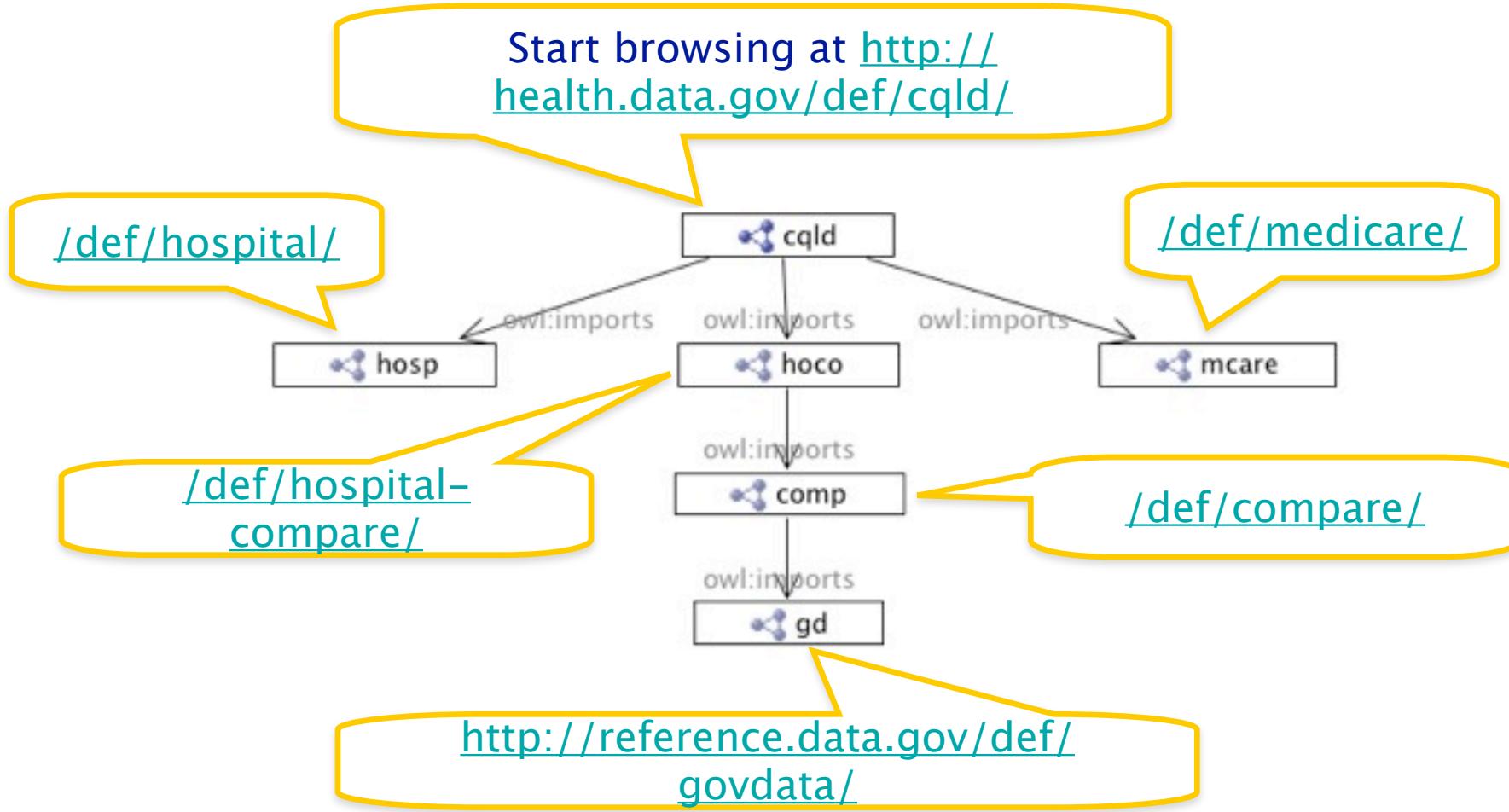
[7] References – Learn More

- Data.gov
 - <http://www.data.gov/semantic>
 - <http://lodt.w.rpi.edu>
- W3C
 - <http://www.w3.org/wiki/LinkedData>
 - <http://www.w3.org/participate/podcastsvideo.html>
- Community sites
 - <http://linkeddata.org>
 - <http://semanticweb.com>
- Books
 - [Linking Enterprise Data](#)
 - [Evolving the Web into a Global Data Space](#)

Part II – Demonstration

1. Exploring the Vocabularies
2. Exploring the Datasets
3. Exploring Multiple representations
4. Query Points
5. Faceted Search
6. Faceted Browsing
7. Other API's
8. Backup

[1] Hospital Compare Vocab (RDF Schemas)



[1] Downloading Hospital Compare Vocabs

- <http://health.data.gov/def/cqld.rdfs>
 - <http://health.data.gov/def/hospital.rdfs>
 - <http://health.data.gov/def/compare.rdfs>
 - <http://health.data.gov/def/hospital-compare.rdfs>
 - <http://health.data.gov/def/medicare.rdfs>
 - <http://reference.data.gov/def/govdata.rdfs>
-
- Note: a common (best) practice redirects requests to any classes/properties to their respective locations above...
 - ***We've diverged from this initially to enable data model browsing***
 - ***and provided rdfs:seeAlso links to the vocab.rdfs file URL's above***

[1] http://health.data.gov/def/cqld/

About: Clinical Quality Linked Data Vocabulary

An Entity of Type : Ontology, within Data Space : [health.data.gov](#)

Start faceted browsing from this Type

A RDF Schema that imports and augments concepts and relationships from other Clinical Quality Linked Data vocabularies.

Attributes	Values
rdf:type	owl:Ontology
rdfs:label	cqld
imports	http://www.w3.org/2003/01/geo/wgs84_pos http://purl.org/dc/terms/ http://rdfs.org/ns/void http://xmlns.com/foaf/0.1/ http://health.data.gov/def/hospital/ xmores
rdfs:isDefinedBy	http://health.data.gov/def/cqld/
rdfs:comment	A RDF Schema that imports and augments concepts and relationships from other Clinical Quality Linked Data vocabularies.
versionInfo	1.0
dc:contributor	Centers for Medicare and Medicaid Services US Department of Health and Human Services
dc:title	Clinical Quality Linked Data Vocabulary
dc:description	A RDF Schema that imports and augments concepts and relationships from other Clinical Quality Linked Data vocabularies.
is rdfs:isDefinedBy of	http://health.data.gov/def/cqld/

The [/cqld/](#) vocab is intended as a ‘bridge’ vocabulary – things that relate concepts in other vocabularies are (or will be) specified here as we add more vocabs for other Clinical Quality domains.

At the moment, it mostly just imports the other vocabularies, including those we created and reused, which makes it a convenient starting place when using an ontology editing tool.

[1] http://health.data.gov/def/hospital/

About: Hospital Vocabulary

An Entity of Type : Ontology, within Data Space : [health.data.gov](#)
Start faceted browsing from this Type

A RDF Schema that defines concepts and relationships used for Hospital data.

Attributes	Values
rdf:type	owl:Ontology
rdfs:label	hospital
imports	http://purl.org/dc/elements/1.1/ http://www.w3.org/2006/vcard/ns http://www.w3.org/ns/org
rdfs:isDefinedBy	http://health.data.gov/def/hospital/
rdfs:comment	A RDF Schema that defines concepts and relationships used for Hos
versionInfo	1.0
dc:contributor	Centers for Medicare and Medicaid Services US Department of Health and Human Services
dc:title	Hospital Vocabulary
dc:description	A RDF Schema that defines concepts and relationships used for Hospital data.
is imports of	http://health.data.gov/def/cqld/
is rdfs:isDefinedBy of	hosp:cacProvider hosp:Hospital http://health.data.gov/def/hospital/ hosp:accreditation hosp:site xmorex

The [/hospital/](#) vocab contains mostly properties that capture values for general hospital information, and categorize the kind of ownership and types of services a hospital provides.

[1] http://health.data.gov/def/compare/

About: Compare Vocabulary

An Entity of Type : [Ontology](#), within Data Space : [health.data.gov](#)
Start faceted browsing from this Type

A RDF Schema that defines concepts and relationships used for comparing Clinical Quality Linked

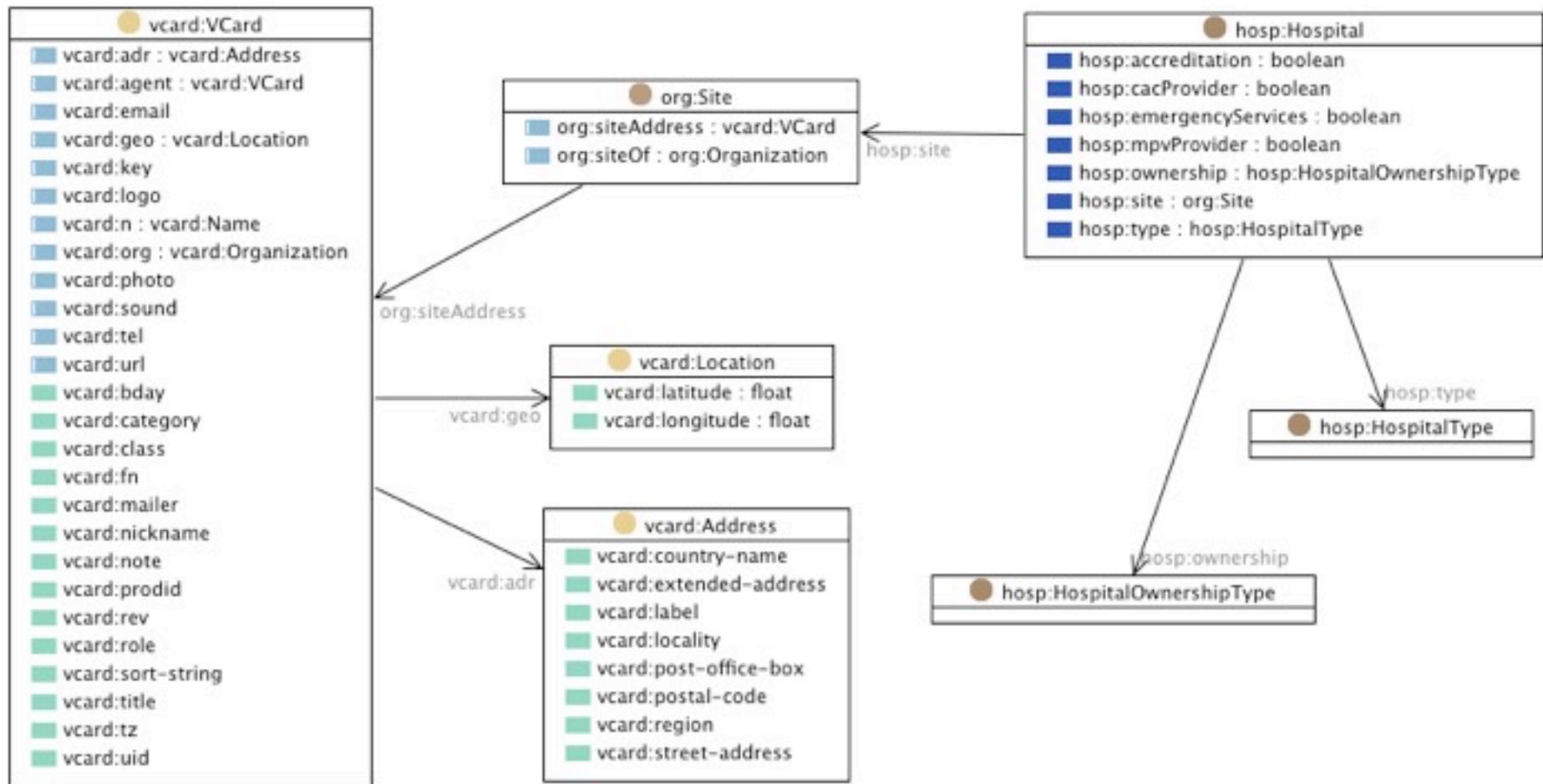
Attributes	Values
rdf:type	owl:Ontology
rdfs:label	compare
imports	http://reference.data.gov/def/govdata/
rdfs:isDefinedBy	http://health.data.gov/def/compare/
rdfs:comment	A RDF Schema that defines concepts and relationships used for comparing Clinical Quality Linked Data.
versionInfo	1.0
dc:contributor	Centers for Medicare and Medicaid Services US Department of Health and Human Services
dc:title	Compare Vocabulary
dc:description	A RDF Schema that defines concepts and relationships used for comparing Clinical Quality Linked
is imports of	http://health.data.gov/def/hospital-compare/
is rdfs:isDefinedBy of	http://health.data.gov/def/compare/ comp:CACTMeasure comp:condition comp:metric comp:measure comp:Metric comp:Condition comp:footnote comp:Footnote comp:ProcessMeasure comp:SurveyMetric comp:SurveyMeasure comp:Measure comp:EfficiencyMeasure comp:StructuralMeasure comp:OutcomeMeasure comp:performance comp:rate

A general purpose vocabulary called [/govdata/](#) captures classes that are common to all open government data.

The [/compare/](#) vocab contains general classes that are relevant to any Clinical Quality domain, not just hospitals – such as [Conditions](#), [Measures](#), and [Metrics](#).

These concepts get subclassed in the [/hospital-compare/](#) vocab, where they're specialized for the Hospital domain.

[1] A Class View of Hospital Information



[1] <http://health.data.gov/def/hospital/Hospital>

About: Hospital

An Entity of Type : Class, within Data Space : [health.data.gov](#)
Start faceted browsing from this Type

Attributes

Values

rdf:type rdfs:Class

rdfs:label Hospital

rdfs:isDefinedBy <http://health.data.gov/def/hospital/>

rdfs:subClassOf rdfs:Resource

disjointWith gd:Country
hoco:Record
hoco:RecordSet
gd:State
<http://www.w3.org/ns/org#Organization>

is rdf:type of <http://health.data.gov/id/hospital/393303>
<http://health.data.gov/id/hospital/063301>
<http://health.data.gov/id/hospital/053302>
<http://health.data.gov/id/hospital/093300>
<http://health.data.gov/id/hospital/393302>
[...more»](#)

The default html view of any class within any vocabulary, (like [hosp:Hospital](#) shown here) will provide some metadata about the class (like what vocab it's defined by), and will also provide a list of instances you can page through or click to access.

« First « Prev [Next](#) Last » Page 1 of 48 1 Go

Explore alternative Linked Data Views & Meshups using: [OpenLink Data Explorer](#) Raw Data in: CXML | CSV | RDF (N-Triples N3/Turtle JSON XML) | OData (Atom JSON) About

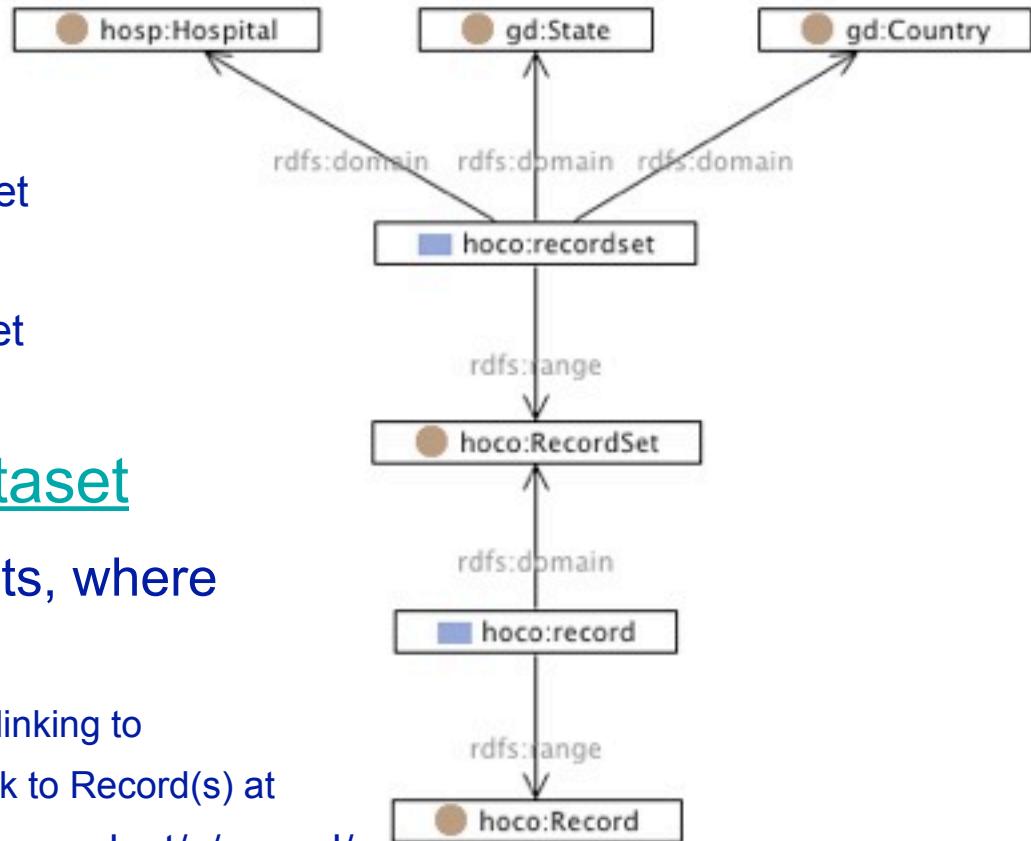


[2] Exploring Datasets

- Get a list of all the source RDF/XML files
 - <http://health.data.gov/datasets>
- Click on one
 - To see it's foaf:homepage, like
 - <http://health.data.gov/dataset/cacp>
 - Then select some dcterms:issued date, like
 - <http://health.data.gov/dataset/cacp/2010-11-24>
 - Then follow the void:exampleResource link to
 - <http://health.data.gov/dataset/cacp/2010-11-24/recordset/1/record/1>
 - To look at the data in one of its hoco:Record(s)

[2] Getting to all Hospital/State/Country Record Data

- Metadata triples (SPO)
 - ‘traversing the graph’
 - Hospital recordset RecordSet
 - State recordset RecordSet
 - Country recordset RecordSet
 - RecordSet record Record



- <http://health.data.gov/dataset>

- Returns a list of all datasets, where
 - /dataset/name/yyyy-mm-dd
 - are void:Dataset(s), each linking to
 - RecordSet(s) that each link to Record(s) at
 - /dataset/name/yyyy-mm-dd/recordset/x/record/y
- <http://health.data.gov/dataset/cacp/2010-11-24/recordset/1/record/1>

[2] <http://health.data.gov/dataset>

Attributes Values

rdf:type foaf:Document

foaf:homepage <http://health.data.gov/dataset/cacn>
<http://health.data.gov/dataset/cacop>
<http://health.data.gov/dataset/cacp> Let's check out /cacp
<http://health.data.gov/dataset/cacs>
<http://health.data.gov/dataset/cn>
<http://health.data.gov/dataset/cp>
<http://health.data.gov/dataset/cs>
<http://health.data.gov/dataset/hn>
<http://health.data.gov/dataset/hophc>
<http://health.data.gov/dataset/hophp>
<http://health.data.gov/dataset/hopnp>
<http://health.data.gov/dataset/hopqdrpq>
<http://health.data.gov/dataset/hopsp>
<http://health.data.gov/dataset/hosp>
<http://health.data.gov/dataset/hp>
<http://health.data.gov/dataset/hpv>
<http://health.data.gov/dataset/hs>
<http://health.data.gov/dataset/mpvop>
<http://health.data.gov/dataset/npy>
<http://health.data.gov/dataset/on>
<http://health.data.gov/dataset/op>
<http://health.data.gov/dataset/os>
<http://health.data.gov/dataset/ppv>
<http://health.data.gov/dataset/q>
<http://health.data.gov/dataset/sm>
<http://health.data.gov/dataset/spv>

Let's check out /cacp

Go to:

<http://health.data.gov/dataset>

to get a list of all the available
source data files

[2] http://health.data.gov/dataset/cacp

[Description](#)[Usage Statistics](#)[Settings](#)

About: Childrens Asthma Care Providers (CACP)

An Entity of Type : Document, within Data Space : health.data.gov

[Start faceted browsing from this Type](#)

Attributes

`rdftype` [foaf:Document](#)

`rdfs:label` CACP

`foaf:primaryTopic` <http://health.data.gov/def/hospital/Hospital>

`dc:terms:title` Childrens Asthma Care Providers (CACP)

`dc:terms:description` Information about hospitals that provide care for children's asthma.

`void:vocabulary` <http://health.data.gov/def/compare>

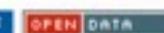
`void:dataset` <http://health.data.gov/dataset/cacp/2010-11-24>
<http://health.data.gov/dataset/cacp/2011-02-25>

`is foaf:homepage of` <http://health.data.gov/dataset/cacp/2010-11-24>
<http://health.data.gov/dataset>
<http://health.data.gov/dataset/cacp/2011-02-25>

Follow the link from the /cacp homepage to a dataset issued on a particular /yyyy-mm-dd date - these will accumulate over time...

Explore alternative Linked Data Views & Mashups using: [OpenLink Data Explorer](#)

Raw Data in: [CXML](#) | [CSV](#) | [RDF \(N-Triples N3/Turtle JSON XML \)](#) | [OData \(Atom JSON \)](#) | [About](#)



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[2] <http://health.data.gov/dataset/cacp/2010-11-24>

About: Childrens Asthma Care Providers (CACP)

An Entity of Type : Dataset, within Data Space : [health.data.gov](#)

[Start faceted browsing from this Type](#)

Information about hospitals that provide care for children's asthma.

Attributes	Values
rdf:type	void:Dataset
rdfs:label	CACP
rdfs:comment	Information about hospitals that provide care for children's asthma.
foaf:homepage	http://health.data.gov/dataset/cacp
foaf:primaryTopic	hosp:Hospital
dcterms:title	Childrens Asthma Care Providers (CACP)
dcterms:description	Information about hospitals that provide care for children's asthma.
dcterms:issued	2010-11-24(xsd:date)
dcterms:source	http://health.data.gov/dataset/cacp/2010-11-24/Final_CAC_Provider_File_2010_11_24.txt
void:sparqlEndpoint	http://health.data.gov/sparql
void:dataDump	http://health.data.gov/dataset/cacp/2010-11-24/Final_CAC_Provider_File_2010_11_24.rdf
void:vocabulary	http://health.data.gov/def/compare
void:exampleResource	http://health.data.gov/dataset/cacp/2010-11-24/recordset/1/record/1
void:triples	3544(xsd:integer)
void:entities	790(xsd:integer)
void:classes	6(xsd:integer)

There's lots of metadata about this /cacp/yyyy-mm-dd dataset release

Download the full dataset

Let's go to an example resource it contains...

[2] <http://health.data.gov/dataset/cacp/2010-11-24/recordset/1/record/1>

[Description](#)[Usage Statistics](#)[Settings](#)

About: <http://health.data.gov/dataset/cacp/2010-11-24/recordset/1/record/1>

An Entity of Type : Record, within Data Space : health.data.gov

[Start faceted browsing from this Type](#)

Attributes

[rdf:type](#)

Values

<http://health.data.gov/def/hospital-compare/Record>

[percentage](#)

100(xsd:double)

[condition](#)

<http://health.data.gov/id/condition/5>

[measure](#)

<http://health.data.gov/id/measure/33>

[http://health.data.../compare/footnote](#) <http://health.data.gov/id/footnote/1>

[denominator](#)

12(xsd:double)

[is record of](#)

<http://health.data.gov/dataset/cacp/2010-11-24/recordset/1>

[is void:exampleResource of](#)

<http://health.data.gov/dataset/cacp/2010-11-24>

<http://health.data.gov/dataset/cacp/2011-02-25>

Records generally have data about Measures and Metrics for specific Conditions

Explore alternative Linked Data Views & Meshups using: [OpenLink Data Explorer](#)

Raw Data in: CXML | CSV | RDF (N-Triples N3/Turtle JSON XML) | OData (Atom JSON) [About](#)



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OpenLink Virtuoso version 06.01.3127, on Linux (x86_64-unknown-linux-gnu), Standard Edition

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[3] <http://health.data.gov/doc/hospital/393303>

About: CHILDREN'S HOSPITAL OF PHILADELPHIA

An Entity of Type : Hospital, within Data Space : health.data.gov

Start faceted browsing from this Type

Attributes

[rdf:type](#) hosp:Hospital

[rdfs:label](#) CHILDREN'S HOSPITAL OF PHILADELPHIA

[recordset](#)
<http://health.data.gov/dataset/cacp/2010-11-24/recordset/119>
<http://health.data.gov/dataset/cacp/2011-02-25/recordset/123>
<http://health.data.gov/dataset/cacp/2010-11-16/recordset/119>
<http://health.data.gov/dataset/cacp/2011-02-15/recordset/123>

[cacProvider](#) 1 (xsd:integer)

[site](#) <http://health.data.gov/id/hospital/393303/site/1>

[stateCode](#) <http://reference.data.gov/id/state/PA>

[countyCode](#) <http://reference.data.gov/id/state/PA/county/620>

[ownership](#) <http://health.data.gov/id/hospital/ownership/type/8>

[type](#) <http://health.data.gov/id/hospital/type/1>

[emergencyServices](#) 1 (xsd:integer)

The default representation for any resource is HTML (more specifically XHTML+RDFa), where data linked to and from various properties will be given.

A number of other resource representations are also available – see below.

But first, let's take a closer look at this representation – by hitting 'view source' (see next slide):

[3] http://health.data.gov/doc/hospital/393303.html

```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML+RDFa 1.0//EN" "http://www.w3.org/MarkUp/DTD/xhtml-rdfa-1.dtd">
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" version="XHTML+RDFa 1.0">

<head>
<title>About: CHILDREN'S HOSPITAL OF PHILADELPHIA</title>
    [snip other header stuff]
</head>

<body about="http://health.data.gov/id/hospital/393303">

    [snip table-row-display-unnumbered-list-list-item stuff]

    <span property="rdfs:label" xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">CHILDREN'S HOSPITAL OF PHILADELPHIA</span>
    <span property="ns5:cacProvider" xmlns:ns5="http://health.data.gov/def/hospital/">1</span>(xsd:integer)</span>
    <span property="ns6:emergencyServices" xmlns:ns6="http://health.data.gov/def/hospital/">1</span>(xsd:integer)</span>

    [snip]

</body>
</html>
```

This XHTML+RDFa representation is human and machine readable!

[3] http://health.data.gov/doc/hospital/393303.html

```
<?xml version="1.0" encoding="utf-8"?>  
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML+RDFa 1.0//EN" "http://www.w3.org/MarkUp/DTD/xhtml-rdfa-1.dtd">  
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" version="XHTML+RDFa 1.0">
```

 **Markup Validation Service**
Check the markup (HTML, XHTML, ...) of Web documents

Jump To: Congratulations · Icons

This document was successfully checked as XHTML + RDFa!

Result:	Passed
Address:	<input type="text" value="http://health.data.gov/doc/hospital/393303.html"/>
Encoding:	utf-8 <input type="button" value="Detect automatically"/>
Doctype:	XHTML + RDFa <input type="button" value="Detect automatically"/>
Root Element:	html
Root Namespace:	http://www.w3.org/1999/xhtml

The W3C validators are hosted on server technology donated by HP, and supported by community donations.
[Donate](#) and help us build better tools for a better web.

Options

Show Source Show Outline List Messages Sequentially Group Error Messages by Type
 Validate error pages Verbose Output Clean up Markup with HTML-Tidy

[Help on the options is available.](#) [Revalidate](#)

Congratulations

[3] http://health.data.gov/doc/hospital/393303.atom

```
<feed xmlns="http://www.w3.org/2005/Atom" xmlns:d="http://schemas.microsoft.com/ado/2007/08/dataservices"
      xmlns:m="http://schemas.microsoft.com/ado/2007/08/dataservices/metadata" xmlns:ns0pred="http://health.data.gov/def/hospital/"
      xmlns:rdfs="http://www.w3.org/2000/01/rdf-schema#">
  <id>http://health.data.gov/doc/hospital/393303.atom</id>
```

New hoco:RecordSet(s) will accumulate over time about/around each hosp:Hospital instance, accessed at their respective feed URLs.

This will also occur for feeds of other type instances, like void:Dataset(s), and for lists of class instances, providing an easy way to be notified as new comp:Measure(s) and comp:Metric(s) get introduced (for example).

{Note: this last part is only partially implemented – we're still tweaking configs and queries! ☺}

```
  </content>
</entry>
</feed>
```

```
  <1/393303/site/1"/>
  </> /dataset/cacp/2010-11-24/recordset/119"/>
  </> /hospital/Hospital"/>
  </> /ital/type/1"/>
  </> /hospital/ownership/type/8"/>
  <a.gov> /dataset/cacp/2011-02-25/recordset/123"/>
  <a.gov> /id/state/PA/county/620"/>
  <a.gov> /id/state/PA"/>
```

[3] /id/hospital/393303/site/1/vcard/1 as JSON

About: <http://health.data.gov/id/hospital/393303/site/1/vcard/1> 

An Entity of Type : vCard Class, within Data Space : health.data.gov

Start faceted browsing from this Type

<http://health.data.gov/id/hospital/393303/site/1/vcard/1.json>

Attributes	Values
rdf:type	vcard2006:VCARD
geographic_latitude	39.948690
geographic_longitude	-75.192899
phone	2155903745
locality	PHILADELPHIA
postal_code	19104
street	34TH ST & CIVIC
is siteAddress of	http://health.data.gov/id/hospital/393303

```
{ "d": {  
  "results": [  
    { "__metadata": { "uri": "http://health.data.gov/id/hospital/393303/site/1" },  
      "http://www.w3.org/ns/org#siteAddress": { "__deferred": { "uri": "http://health.data.gov/id/  
hospital/393303/site/1/vcard/1" } }  
    ],  
    { "__metadata": { "uri": "http://health.data.gov/id/hospital/393303/site/1/vcard/1" },  
      "http://www.w3.org/2006/vcard/ns#locality": "PHILADELPHIA",  
      "http://www.w3.org/1999/02/22-rdf-syntax-ns#type": { "__deferred": { "uri": "http://  
www.w3.org/2006/vcard/ns#VCard" } },  
      "http://www.w3.org/2006/vcard/ns#latitude": "39.948690",  
      "http://www.w3.org/2006/vcard/ns#postal-code": "19104",  
      "http://www.w3.org/2006/vcard/ns#street-address": "34TH ST & CIVIC CENTER  
BLVD",  
      "http://www.w3.org/2006/vcard/ns#tel": "2155903745",  
      "http://www.w3.org/2006/vcard/ns#longitude": "-75.192899"  
    }  
  ],  
  "__count": "2"  
}
```

Alternative Linked Data Views: [SPARQL](#) | [ODE](#) Raw Data in: [CXML](#) | [CSV](#) | [RDF \(N-Triples N3/Turtle JSON XML \)](#) | [OData \(Atom JSON \)](#) [About](#)

[4] Using the /isparql Visualization Service

About: <http://health.data.gov/id/hospital/393303/site/1/vcard/1> 

An Entity of Type : vCard Class, within Data Space : health.data.gov

Start faceted browsing from this Type

Attributes

rdf:type vcard2006:VCARD

geographic.latitude 39.948690

geographic.longitude -75.192899

phone 2155903745

locality PHILADELPHIA

postal_code 19104

street 34TH ST & CIVIC CENTER BLVD

is siteAddress of <http://health.data.gov/id/hospital/393303/site/1>

Go to any
</id/hospital/{guid}/site/1/vcard/1>
Then click on the 'iSPARQL' link
And select Google Maps View:
(see next slide)

Alternative Linked Data Views: [iSPARQL](#) | [ODE](#) Raw Data in: [CXML](#) | [CSV](#) | [RDF \(N-Triples N3/Turtle JSON XML \)](#) | [OData \(Atom JSON \)](#) | [About](#)



[4] /isparql GMap of /hospital/393303/site/1/vcard/1

Result SPARQL Params Response Query 1(1) View: Google Maps v3

Permalink

Map Satellite

The map displays the University of Pennsylvania campus and surrounding areas. A red marker indicates the location of The Children's Hospital of Philadelphia, located at 34TH ST & CIVIC CENTER BLVD. The map also shows the Hospital of the University of Pennsylvania and other medical facilities like the Perelman Center for Advanced Medicine and the Roberts Proton Therapy Center. Major roads like S 38th St, S Walnut St, and E Service Dr are visible, along with highways I-13 and I-76.

1

rdf:type <http://www.w3.org/2006/vcard/ns#VCARD>
locality PHILADELPHIA
tel 2155903745
postal-code 19104
street-address 34TH ST & CIVIC CENTER BLVD

[4] http://health.data.gov/isparql - Visual Query Service

The screenshot shows the iSPARQL service interface. At the top, there are tabs for QBE, Advanced, and Results. Below the tabs is a toolbar with icons for file operations like Open, Save, and Print. A navigation bar includes Graph, Named Graphs (0), and Clear. The main area is titled SPARQL Query and contains the following code:

```
PREFIX hosp: <http://health.data.gov/def/hospital/>
PREFIX gd: <http://reference.data.gov/def/govdata/>
PREFIX hoco: <http://health.data.gov/def/hospital-compare/>
PREFIX comp: <http://health.data.gov/def/compare/>

select distinct ?Hospital ?Measure ?Metric ?Admissions ?Percentage
where {
  ?s1 a hosp:Hospital ;
    rdfs:label ?Hospital ;
    gd:stateCode ?s2 ;
    hoco:recordset ?s3 .

  filter (?s2 = <http://reference.data.gov/id/state/DC>) .

  ?s3 hoco:record ?Record_URI .

  ?Record_URI comp:measure ?s5 ;
    gd:percentage ?Percentage ;
    comp:metric ?Metric_URI ;
    hoco:admissions ?Admissions .

  filter (?s5 = <http://health.data.gov/id/measure/30>).
  ?s5 rdfs:comment ?Measure .

  filter (?Metric_URI = <http://health.data.gov/id/metric/15>).
  ?Metric_URI rdfs:comment ?Metric .
}
```

A yellow callout bubble points to the right side of the query code. Inside the bubble, the following text is displayed:

This query finds a needle in the RDF haystack. It asks the iSPARQL Service to return;

Any Hospitals in DC that have any 30-day Readmission Rate(a specific Measure) Records where the readmission percentage is worse than the US national rate (a specific Metric).

[4] /isparql - Generating Visual and Textual Queries

ISPARQL File Help Logged in as dav

QBE Advanced Results

Data Source (URL):

The interface shows a query graph on the left and configuration panels on the right.

Query Graph:

- Nodes: ?Metric_URI, ?Metric, ?Record_URI, ?Admissions, ?Percentage, ?s5, ?s6, ?Metric_Uri, ?s1, ?s2, ?s3, ?Hospital.
- Predicates:
 - ?Metric_URI rdfs:comment ?Metric
 - ?Metric_URI comp:metric ?Record_URI
 - ?Record_URI gd:percentage ?Percentage
 - ?Record_URI comp:measure ?s5
 - ?Percentage rdfs:comment ?s6
 - ?s5 rdfs:comment ?Metric_Uri
 - ?Record_URI hoco:admissions ?Admissions
 - ?Record_URI hoco:record ?s3
 - ?s1 hospital:hospital ?s1
 - ?s1 gd:stateCode ?s2
 - ?s2 rdfs:label ?Hospital

Node Panel (Top Right):

- Type: URI
- Variable: ?Hospital
- Datatype:
- Order By
- Visible

Schemas Panel (Bottom Right):

- rdflib:
- gd:
 - Properties
 - stateCode
 - percentage
- hoco:
 - Properties
 - recordset
 - record
 - admissions
- comp:
 - Properties
 - measure
 - metric
- unbound

order by

[4] /isparql - Query Response/Result in XML

Result SPARQL Params Response Query 1(1)

Execute Permalink Anchor behavior:

Hospital	Measure	Metric	Admissions	Percentage
HOWARD UNIVERSITY HOSPITAL	30-Day Readmission Rate	Worse than U.S. National Rate	250	28.9
GEORGE WASHINGTON UNIV HOSPITAL	30-Day Readmission Rate	Worse than U.S. National Rate	291	29.3

Result SPARQL Params Response Query 1(1)

```
<sparql xmlns="http://www.w3.org/2005/sparql-results#" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation=""

<head>
<variable name="Hospital"/>
<variable name="Measure"/>
<variable name="Metric"/>
<variable name="Admissions"/>
<variable name="Percentage"/>
</head>
<results distinct="false" ordered="true">
<result>
<binding name="Hospital"><literal>HOWARD UNIVERSITY HOSPITAL</literal></binding>
<binding name="Measure"><literal>30-Day Readmission Rate</literal></binding>
<binding name="Metric"><literal>Worse than U.S. National Rate</literal></binding>
<binding name="Admissions"><literal datatype="http://www.w3.org/2001/XMLSchema#int">250</literal></binding>
<binding name="Percentage"><literal datatype="http://www.w3.org/2001/XMLSchema#double">28.9</literal></binding>
</result>
<result>
<binding name="Hospital"><literal>GEORGE WASHINGTON UNIV HOSPITAL</literal></binding>
<binding name="Measure"><literal>30-Day Readmission Rate</literal></binding>
<binding name="Metric"><literal>Worse than U.S. National Rate</literal></binding>
<binding name="Admissions"><literal datatype="http://www.w3.org/2001/XMLSchema#int">291</literal></binding>
<binding name="Percentage"><literal datatype="http://www.w3.org/2001/XMLSchema#double">29.3</literal></binding>
</result>
</results>
</sparql>
```

[5] /facet Search – Keyword Text

A screenshot of a web-based search interface titled "Precision Search & Find". At the top, there are three tabs: "Text Search" (which is highlighted with a yellow border), "URI Lookup (by Label)", and "URI Lookup". To the right of the tabs are links for "Featured", "Demo Queries", and "About". Below the tabs, there is a search form with a "Search Text" input field containing the word "hospital" and a "Search" button. A yellow callout bubble originates from the "Text Search" tab and points to the explanatory text below.

Precision Search & Find

Search Text

Use the Faceted Search service at
<http://health.data.gov/facet>
for executing normal keyword
searches, such as the search for
keyword '**hospital**' shown here.

[5] /facet Search – Keyword Results

The screenshot shows a search interface with the following elements:

- OpenLink Software** logo in the top left.
- Powered by VIRTUOSO** logo in the top right.
- Displaying Ranked Entity Names and Text summaries where:** Entity1 has any Attribute with Value "hospital" Drop.
- View query as SPARQL** link.
- Entity Relations Navigation** sidebar with links for Types, Attributes, Referencing Attributes, Places (dropdown set to "Shown items"), Options, Save, Featured Queries, and New Search.
- Results List:**
 - hosp:Hospital
 - <http://health.data.gov/id/hospital/360002> SAMARITAN HOSPITAL - PEOPLES H
 - <http://health.data.gov/id/footnote/2> 2
 - <http://health.data.gov/id/hospital/431318> BOWDLE HOSPITAL - CRITICAL AC HOSPITAL
 - <http://health.data.gov/id/hospital/351309> UNION HOSPITAL MERITCARE MAY HOSPITAL AND CL
 - <http://health.data.gov/al/ownership/type/2> Government - Hospital District or Authority
 - <http://health.data.gov/id/measure/56> h_quiet_hsp
- Annotations:**
 - A yellow arrow points from the text "The highest ranked match for keyword 'hospital'" to the first result in the list: "hosp:Hospital".
 - A yellow callout box surrounds the first result: "hosp:Hospital". Inside the box:
 - The text: "The highest ranked match for keyword 'hospital' is the URI for the Hospital class in the hospital vocabulary – hosp:Hospital".
 - The text: "When you click that link, you land on a page about the hosp:Hospital class, see next slide...".
 - Below the first result, there is a snippet of text:

AuthorityGovernment **Hospital** District or AuthorityGovernment **Hospital** District or...
Hospital District or Authority.

Quietness of **Hospital** EnvironmentQuietness of **Hospital** EnvironmentQuietness of **Hospital**...
of **Hospital** EnvironmentQuietness of **Hospital** EnvironmentQuietness of **Hospital**... of
Hospital Environment.

Cleanliness of **Hospital** EnvironmentCleanliness of **Hospital** EnvironmentCleanliness of

[5] /facet Search – from Keyword Text to Structured Data



POWERED BY
VIRTUOSO

Description

Usage Statistics

Settings

About: Hospital

An Entity of Type : Class, within Data Space : [health.data.gov](#)
Start faceted browsing from this Type

Attributes

[rdf:type](#) rdfs:Class

[rdfs:label](#) Hospital

[rdfs:isDefinedBy](#) <http://health.data.gov/def/hospital/>

[rdfs:subClassOf](#) rdfs:Resource

[disjointWith](#) gd:Country
[hoco:Record](#)
[hoco:RecordSet](#)
gd:State
[http://www.w3.org/ns/org#Organization](#)

[is rdf:type of](#) <http://health.data.gov/id/hospital/393303>
<http://health.data.gov/id/hospital/063301>
<http://health.data.gov/id/hospital/053302>
<http://health.data.gov/id/hospital/093300>
<http://health.data.gov/id/hospital/393302>
[...more»](#)

This page tells you that hosp:Hospital is a (rdf:type) rdfs:Class ...

...and which RDFS Vocabulary this class is defined by...

...and also provides a list of all the instances of this class that you can page through or click through to.

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Alternative Linked Data Views: [SPARQL](#) | [ODE](#) Raw Data in: [CXML](#) | [CSV](#) | [RDF](#) ([N-Triples](#) [N3/Turtle](#) [JSON XML](#)) | [OData](#) ([Atom](#) [JSON](#)) | [About](#)



[5] /facet Search – from Metadata Labels



POWERED BY
VIRTUOSO

The screenshot shows a web-based search interface for 'Precision Search & Find'. At the top, there are three tabs: 'Text Search', 'URI Lookup (by Label)', and 'URI Lookup'. The 'URI Lookup (by Label)' tab is highlighted with a yellow border. Below the tabs, the text 'Precision Search & Find' is displayed. A search input field labeled 'Label' contains the text 'Hospital'. To the right of the input field is a 'Describe' button. A dropdown menu is open, listing several URIs and their labels. The first item in the list is highlighted with a blue background: 'Hospital http://health.data.gov/def/hospital/Hospital'. Other items in the list include 'hospital http://health.data.gov/def/hospital/' and 'Hospital Characteristics (HOSP) http://health.data.gov/dataset/hosp/2010-11-24'. The background of the page is light blue, and the overall layout is clean and modern.

You can also use the Faceted Search service at
<http://health.data.gov/facet>

for executing `rdfs:label` searches, such as the search for label ‘Hospital’ shown here, which displays instant results, showing on the left the matching `rdfs:label` of the `hosp:Hospital` class, followed by anything else having the string ‘Hospital’ in its `rdfs:label`. Selecting the highlighted suggestion takes you to the next slide...

[5] /facet Search – to Metadata Classes



POWERED BY
VIRTUOSO

Description

Usage Statistics

Settings

About: Hospital



An Entity of Type : Class, within Data Space : [health.data.gov](#)

[Start faceted browsing from this Type](#)

Attributes Values

`rdf:type` [rdfs:Class](#)

`rdfs:label` Hospital

`rdfs:isDefinedBy` <http://health.data.gov/def/hospital/>

`rdfs:subClassOf` [rdfs:Resource](#)

`disjointWith` [gd:Country](#)
[hoco:Record](#)
[hoco:RecordSet](#)
[gd:State](#)
<http://www.w3.org/ns/org#Organization>

`is rdf:type of` <http://health.data.gov/id/hospital/393303>
<http://health.data.gov/id/hospital/063301>
<http://health.data.gov/id/hospital/053302>
<http://health.data.gov/id/hospital/093300>
<http://health.data.gov/id/hospital/393302>
[+more»](#)

And we're back on the page about the hosp:Hospital class as expected...

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[5] /facet Search – URI Lookup



The screenshot shows a web interface for a search service. At the top, there are three tabs: "Text Search", "URI Lookup (by Label)", and "URI Lookup". The "URI Lookup" tab is highlighted with a yellow box. Below the tabs, the title "Precision Search & Find" is displayed. A search bar labeled "URI" contains the text "http://health.data.gov/def/hospital/". To the right of the search bar is a "Describe" button. Below the search bar, a dropdown menu displays suggestions: "http://health.data.gov/def/hospital/Hospital" and "http://health.data.gov/def/hospital/HospitalOwnershipType".

Lastly, you can also use the Faceted Search service at
<http://health.data.gov/facet>

for executing **URI Lookup** searches, such as the search for <http://health.data.gov/def/hospital/> shown here, which also displays instant results, beginning with the class Hospital which is specified in that vocabulary, followed by other entities in that vocab. Selecting the highlighted suggestion takes you once again to...

[6] /facet Browsing – Interactive Query Builder



POWERED BY
VIRTUOSO

Description

Usage Statistics

Settings

About: Hospital

An Entity of Type: Class, within Data Space : health.data.gov
Start faceted browsing from this Type

Attributes

rdf:type rdfs:Class

rdfs:label Hospital

rdfs:isDefinedBy <http://health.data.gov/def/hospital/>

rdfs:subClassOf rdfs:Resource

disjointWith gd:Country
hoco:Record
hoco:RecordSet
gd:State
<http://www.w3.org/ns/org#Organization>

is rdf:type of <http://health.data.gov/id/hospital/393303>
<http://health.data.gov/id/hospital/063301>
<http://health.data.gov/id/hospital/053302>
<http://health.data.gov/id/hospital/093300>
<http://health.data.gov/id/hospital/393302>
[...more»](#)

This time, let's try something new
and click on the
**'Start faceted browsing from this
Type'** link

The hosp:Hospital class page. From here,
you can 'follow your nose' and traverse
the graph by dereferencing links on this
page, which is fundamentally the most
basic form of '**faceted browsing**'.

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Alternative Linked Data Views: [SPARQL](#) | [ODE](#) Raw Data in: [CXML](#) | [CSV](#) | [RDF](#) ([N-Triples](#) [N3/Turtle](#) [JSON XML](#)) | [OData](#) ([Atom](#) [JSON](#)) | [About](#)



[6] /facet Browsing – All Instances of hosp:Hospital

The results on the bottom left match this triple:
(any) Entity1 (that) is a (rdf:type) hosp:Hospital

View query as SPARQL

Showing 1-20 of 470 total [Next](#)

Entity Relations Navigation

Text Set

Types

Attributes

Composite Attributes (Aggregated)

Now, under the Entity Relations Navigation area on the right;

Step 1. click on Attributes to see what properties (arcs) are connected to Entity1 instances (nodes), which will find anything that links to the class hosp:Hospital

Describe CHILDREN'S HOSPITAL OF PHILADELPHIA
Describe CHILDRENS HOSPITAL ASSOCIATION THE
Describe CHILDRENS HOSP OF LOS ANGELES
Describe CHILDREN'S HOSPITAL NMC
Describe CHILDREN'S HOSPITAL OF PITTSBURGH OF UPMC
Describe CHILDREN'S HOSPITAL BOSTON
Describe ARKANSAS CHILDREN'S HOSPITAL
Describe MILLER CHILDREN'S HOSPITAL
Describe UNIV OF S AL CHILDREN'S & WOMEN'S HOS
Describe CHILDREN'S HOSPITAL OF MICHIGAN
Describe CHILDRENS MERCY HOSPITAL
Describe LUCILE SALTER PACKARD CHILDREN'S HSP AT STANFORD
Describe COOK FT WORTH CHILDRENS MEDICAL CENTER
Describe DRISCOLL CHILDRENS HOSPITAL
Describe SEATTLE CHILDREN'S HOSPITAL
Describe PHOENIX CHILDREN'S HOSPITAL
Describe CHILDREN'S HOSPITAL & MEDICAL CENTER
Describe PRIMARY CHILDRENS MEDICAL CENTER
Describe CONNECTICUT CHILDRENS MEDICAL CENTER
Describe CHILDREN'S HOSPITALS & CLINICS/MPLS

Complete result - 4701 processed in 411 msec.

[6] /facet Browsing – hosp:Hospital Arcs



Displaying Attributes of Entities where:

Entity1 is a **hosp:Hospital**. Drop

[View query as SPARQL](#)

Attribute

- Describe recordset
- Describe rdf:type
- Describe rdfs:label
- Describe site
- Describe stateCode
- Describe countyCode
- Describe ownership
- Describe type
- Describe emergencyServices
- Describe mpvProvider
- Describe cacProvider

Step 2. Select the rdfs:label link to add another triple to the graph matching pattern at the top left.

Step 3. ‘Refocus’ your node by clicking on Entity1 (top left) again, and then select Attribute again top right, returning to this screen.

Step 4. Select the mpvProvider arc to add yet another triple to the pattern at the top left.

You’re building a simple SPARQL query, which so far should start to look like the next slide...

Complete result - 11 processed in 5404 msec.

Resource utilization: 661.5KR rnd 5.584MR seq 0P disk 0B / 0 messages

Faceted Search & Find service



OpenLink Virtuoso version 06.01.3127, on Linux (x86_64-unknown-linux-gnu), Standard Edition

[6] /facet Browsing – Filtering Property Values



List of el where:

Entity1 is a **hosp:Hospital** . Drop
Entity1 **rdfs:label** Entity2 . Drop Entity2
Entity1 **hosp:mpvProvider** Entity3 . Drop Entity3 Entity3 = 1 . Drop

[View query as SPARQL](#)

Describe BONNER GENERAL HOSPITAL
Describe NORTH GENERAL HOSPITAL
Describe CHEBOYGAN MEMORIAL HOSPITAL
Describe MARK TWAIN ST JOSEPH'S HOSPITAL
Describe PIONEER HEALTH SERVICES OF NEWTON
Describe EDMOND MEDICAL CENTER
Describe SHELBY REGIONAL MEDICAL CENTER
Describe CENTRAL VIRGINIA TRAINING CENTER
Describe ST JOHN NORTH SHORES HOSPITAL
Describe HENRY FORD COTTAGE HOSPITAL
Describe JAMES LAWRENCE KERNAN HOSPITAL INC
Describe FLORIDA STATE HOSPITAL UNIT 31 MED
Describe HASKELL COUNTY HEALTHCARE SYSTEM
Describe BAPTIST HOSPITAL WEST
Describe FISHERMEN'S HOSPITAL
Describe LBJ TROPICAL MEDICAL CENTER
Describe UNIVERSITY OF TEXAS M D ANDERSON CANCER CENTER,THE
Describe HOSPITAL OF THE FOX CHASE CANCER CENTER
Describe LANTERMAN DEVELOPMENTAL CENTER
Describe WINNEBAGO IHS HOSPITAL

Step 5. Click on Entity3, which is the object of the triple with subject Entity1 and predicate hosp:mpvProvider to focus it, then select the value '1' from the left, to assert that the object (node) of the hosp:mpvProvider property (arc) must have value '1', and your screen should look as it does here.

The list at the bottom left now displays only the names of hospitals that provide Medicare payment and volume info.

[6] /facet Browsing – adding Property/Values



Displaying Attributes of Entities where:

Entity1 is a **hosp:Hospital** . Drop

Entity1 **rdfs:label** Entity2 . Drop Entity2

Entity1 **hosp:mpvProvider** Entity3 . Drop Entity3 Entity3 = 1 . Drop

Entity1 **gd:stateCode** Entity4 . Drop Entity4 Entity4 = <http://reference.data.gov/id/state/CA> . Drop

Entity1 **hoco:recordset** Entity5 . Drop Entity5

[View query as SPARQL](#)

Attribute

Describe record

Describe rdf:type <http://health/>

Complete result - 2 process
Resource utilization: 14.48%

Step 6. Refocus (by clicking on) Entity1 again, and select Attributes from the right again, this time selecting the gd:stateCode property.

Step 7. Focus Entity4 and assign it's value to be 'CA' for California, by selecting the first State in the new bottom left list .

Step 8. Focus Entity1 again, select Attributes again, and this time select the hoco:recordset property

Step. 9 Focus Entity5, select Attributes, and select the record property

And your screen should look as it does in the next slide...

[6] /facet Browsing – Bookmark Your Query



where:

Entity1 is a **hosp:Hospital** . Drop

Entity1 **rdfs:label** Entity2 . Drop Entity2

Entity1 **hosp:mpvProvider** Entity3 . Drop Entity3 Entity3 = 1 . Drop

Entity1 **gd:stateCode** Entity4 . Drop Entity4 Entity4 = <http://reference.data.gov/id/state/CA> . Drop

Entity1 **hoco:recordset** Entity5 . Drop Entity5 Entity5 **hoco:record** Entity6 . Drop Entity6

[View query as SPARQL](#)

Showing 1-20 of 137 total [» Next](#)

You can save and
bookmark the queries you
generate from browsing
facets!

Entity Relations Navigation

Text [Set](#)

Types
Attributes
Referencing Attributes
Distinct values (Aggregated)
Show Matching Values

Places

Options

[6] /facet Browsing – Examine Your Query



where:

Entity1 is a **hosp:Hospital** . Drop

Entity1 **rdfs:label** Entity2 . Drop Entity2

Entity1 **hosp:mpvProvider** Entity3 . Drop Entity3 Entity3 = 1 . Drop

Entity1 **gd:stateCode** Entity4 . Drop Entity4 Entity4 = <http://reference.data.gov/id/state/CA> . Drop

Entity1 **hoco:recordset** Entity5 . Drop Entity5 Entity5 **hoco:record** Entity6 . Drop Entity6

[View query as SPARQL](#)

Now that you've generated a list (on the left) of all the records for all the hospitals in California that are Medicare payment volume providers using the faceted browsing feature (aka 'data surfing');

Take a look at the SPARQL query you generated by clicking on the '**View query as SPARQL**' link –

Which takes you to the next slide...

[6] /sparql Endpoint – Select a Response Format

OpenLink Virtuoso SPARQL Query

This query page is designed to help you test OpenLink Virtuoso SPARQL protocol endpoint.

Consult the [Virtuoso Wiki page](#) describing the service or the [Online Virtuoso Documentation](#) section [RDF Database and SPARQL](#).

There is also a rich Web based user interface with sample queries. You can access it at: [/sparql](#).

Query

Default Graph URI

(Security restrictions of this server do not allow you to retrieve remote RDF data. Database administrator can change them, according to these [instructions](#).)

Query text

```
select distinct ?s6 as ?c1 where {?s1 a <http://health.data.gov/def/hospital/Hospital> . ?s1 <http://www.w3.org/2000/01/rdf-schema#label> ?s2 . ?s1 <http://health.data.gov/def/hospital/mpvProvider> ?s3 . filter (?s3 = 1) . ?s1 <http://reference.data.gov/def/govdata/stateCode> ?s4 . filter (?s4 = <http://reference.data.gov/id/state/CA>) . ?s1 <http://health.data.gov/def/hospital-compare/recordset> ?s5 . ?s5 <http://health.data.gov/def/hospital-compare/record> ?s6 . } order by desc (<LONG::IRI_RANK> (?s6)) limit 20 offset 0
```

Format of the query: Execution time
Auto
HTML
Spreadsheet
XML
JSON
Javascript
NTriples
RDF/XML
CSV

(The CXML output is disabled, see [FAQ](#))

OpenLink Virtuoso

You'll end up at the SPARQL endpoint service at
<http://health.data.gov/sparql>
where you can select multiple query response formats – we'll select JSON, since it's such a popular format for mashup apps.

[6] /sparql Endpoint – Run Your Query

This query page is designed to help you test OpenLink Virtuoso. Consult the [Virtuoso Wiki page](#) describing the service or the [Online Virtuoso Documentation](#) section [RDF Database and SPARQL](#).

There is also a rich Web based user interface with sample queries. You can access it at: [/sparql](#).

Query

Default Graph URI

(Security restrictions of this server do not allow you to retrieve remote RDF data. Database administrators can change this setting.)

Query text

```
select distinct ?Hospital ?Record_URI  
where {  
?s1 a <http://health.data.gov/def/hospital/Hospital> .  
?s1 <http://www.w3.org/2000/01/rdf-schema#label> ?Hospital .  
?s1 <http://health.data.gov/def/hospital/mpvProvider> ?s3 .  
filter (?s3 = 1) . ?s1 <http://reference.data.gov/def/govdata/stateCode> ?s4 .  
filter (?s4 = <http://reference.data.gov/id/state/CA>) .  
?s1 <http://health.data.gov/def/hospital--compare/recordset> ?s5 .  
?s5 <http://health.data.gov/def/hospital--compare/records> ?Record_URI .  
}
```

Rigorous check of the query: Execution timeout, in milliseconds, values less than 10000

JSON (The CXML output is disabled, see [details](#)) Display the result and not save

Run Query Reset

You might also want to make minor edits to the SPARQL query you generated, reformatting it for readability, making variable names that get used as results headers more meaningful to humans, before you click ‘Run Query’ (on the bottom left)

[6] /sparql – Mash on Your Results

This query
Consult th
There is al
Query
Default
(Secure
Query ti
select d
where {
?s1 a <
?s1 <ht
?s1 <ht
filter (?s
filter (?s
?s1 <ht
?s5 <ht
}

Rigorou
JSON
Run C

Last Saved: 5/19/11 11:56:03 AM
File Path: ~/Documents/CA_Hosp_mvpProvider_Records.json

CA_Hosp_mvpProvider_Records.json

Which (as you might expect) produces some lovely RDF data in a JSON format for you to use in further application processing, visualization tools, or what have you.

Mash away!

1 | 1 | JSON | Unicode (UTF-8) | Unix (LF) | 0 / 0 / 0 | Show all downloads...

[7] Facet Service API

- Retrieve a list of Hospitals (instances of type Hospital)
 - Using cURL and your favorite terminal shell:

```
curl -H "Content-Type: text/xml" -d @post.xml http://health.data.gov/fct/service
```

```
Terminal — bash — 150x36
calder:Documents glyf$ curl -H "Content-Type: text/xml" -d @post.xml http://health.data.gov/fct/service
```

- Where post.xml is a simple ‘Plain Old XML’ (POX) file containing the following query;

```
<?xml version="1.0"?>
<query>
  <class iri="[hosp:Hospital]" />
  <view type="list" />
</query>
```

[7] Facet Service API

- And get POX returned

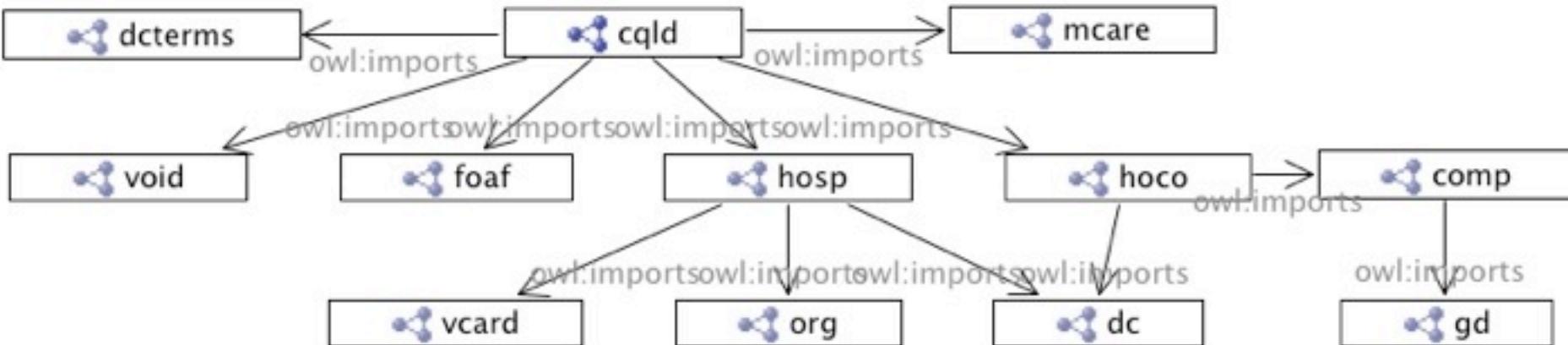
```
<fct:facets>
  <fct:result>
    [...snip]
    <fct:row>
      <fct:column datatype="url">http://health.data.gov/id/hospital/393303</fct:column>
    </fct:row>
    <fct:row>
      <fct:column datatype="url">http://health.data.gov/id/hospital/160156</fct:column>
    </fct:row>
    [...snip...]
  </fct:result>
</fct:facets>
```

Backup Slides

Machine User Agent

- URI content served to a normal Web browser
 - curl URI
- URI content served as RDF/XML
 - curl -H "Accept: application/rdf+xml" URI
- URI content served as RDF-JSON
 - curl -H "Accept: application/rdf+json" URI

All Vocab



- Reused the usual suspects;
 - W3C: void, vcard, org
 - Dublin Core: dc, dcterms
- Interested in;
 - SKOS, SDMX-RDF, QB

Tools We Used

- Google Refine + DERI RDF extension
 - Graph prototyping, source.tsv lifting
- Top Braid Composer
 - Vocabulary modeling (RDFS)
 - Initial instance data testing (inferences and queries)
- Jena
 - schemagen .rdfs to .java
 - ETL source.tsv to source.rdf/ttl
- Virtuoso
 - Quad store, HTTP conneg / url_rewrite rules
 - Faceted search and browse, REST API's